No calculators allowed on items 1 to 2.

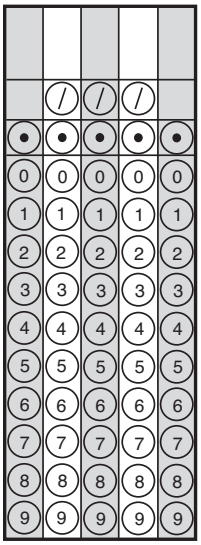
1. For each number, indicate whether it is rational or irrational.

	Rational	Irrational
$\frac{4}{7}$	☐	☐
$\sqrt{30}$	☐	☐
$\frac{21}{\sqrt{4}}$	☐	☐
π	☐	☐
-27	☐	☐

2. A square with side length s has an area of 324 square centimeters. This equation shows the area of the square.

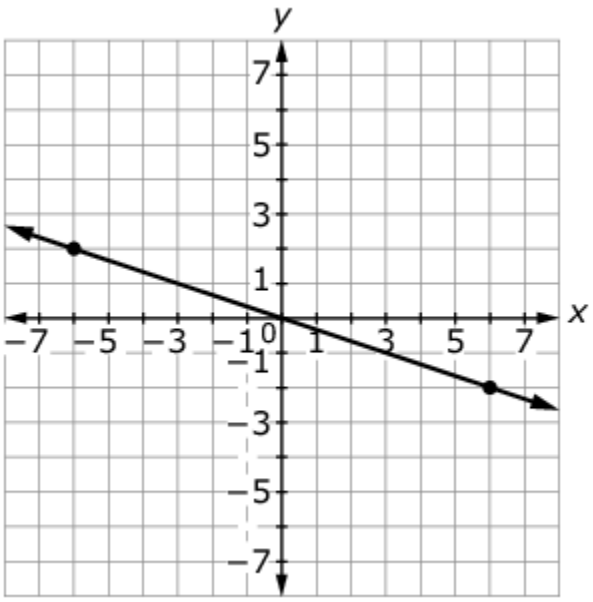
$s^2 = 324$

What is the side length of the square in centimeters?



Calculators allowed on the following items.

3. Consider this graph of a line.



Enter an equation for the line.

4. Joe solved this linear system correctly.

$6x + 3y = 6$

$y = -2x + 2$

These are the last two steps of his work.

$6x - 6x + 6 = 6$

$6 = 6$

Which statement about this linear system must be true?

A. x must equal 6

B. y must equal 6

C. There is no solution to this system.

D. There are infinitely many solutions to this system.

5. Write one number in each box to create an equation that has no solution.

$8x - 3x + 2 - x = \square x + \square$

6. Segment FG begins at point $F(-2, 4)$ and ends at point $G(-2, -3)$. The segment is translated by $\langle x - 3, y + 2 \rangle$ and then reflected across the y-axis to form segment $F'G'$.

How many units long is segment $F'G'$?

A. 0

B. 2

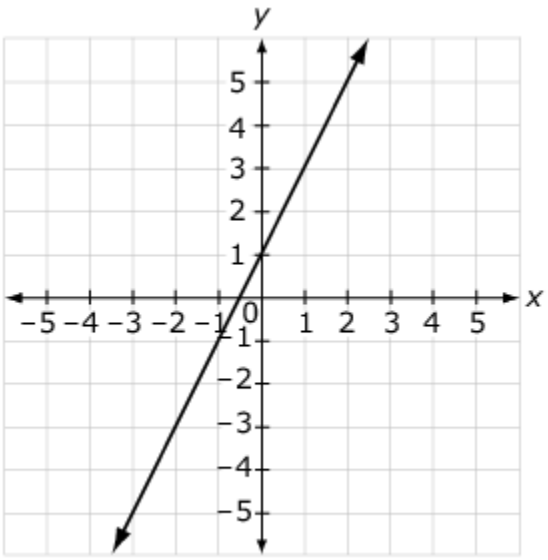
C. 3

D. 7

7. A sequence of transformations is applied to a polygon. Select **all** statements that indicate a sequence of transformations where the resulting polygon has an area greater than the original polygon.

- ☐ Reflect over the *x*-axis, dilate about the origin by a scale factor of $\frac{1}{2}$, translate up 5 units.
- ☐ Rotate 90° counterclockwise around the origin, dilate about the origin by a scale factor of $\frac{3}{2}$.
- ☐ Dilate about the origin by a scale factor of $\frac{2}{3}$, rotate 180° clockwise around the origin, translate down 2 units.
- ☐ Dilate about the origin by a scale factor of 2, reflect over the *y*-axis, dilate about the origin by a scale factor of $\frac{2}{3}$.

8. Consider this graph of a line.



Which equation has a rate of change **greater than** the rate of change for the line shown?

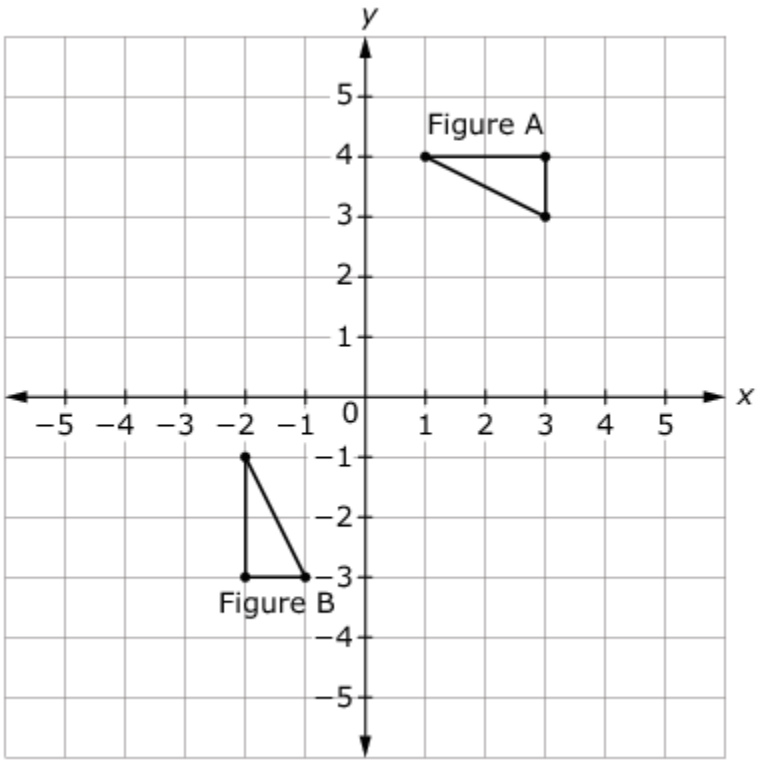
A. $y = 3x - 1$

B. $y = \frac{x}{2} + 4$

C. $y = 2x + 2$

D. $y = \frac{x}{3} - 3$

9. Two figures are shown on a coordinate grid.



Show that Figure A and Figure B are congruent by describing a sequence of basic transformations that maps Figure A onto Figure B. In your response, be sure to identify the transformations in the order they are performed.

10. The table shows the relationship between the average number of hours students study for a mathematics test and their average grade.

Hours Studying	Average Grade
0	62
1	78
2	85
5	74

Which type of function is most likely to model these data?

A. linear function with positive slope

B. linear function with negative slope

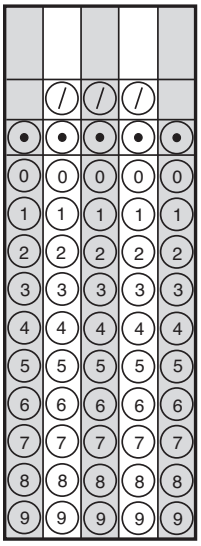
C. non-linear function that decreases then increases

D. non-linear function that increases then decreases

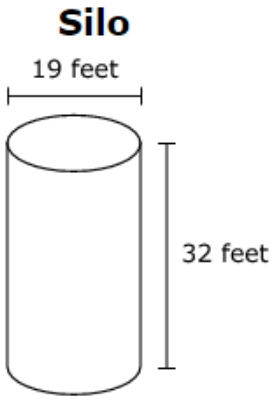
11. This table shows the linear relationship of the water level in a tank and time.

Time (hr)	Water Level (ft)
0	50
2	40
4	30
6	20

Enter the rate of change of the water level in feet per hour.



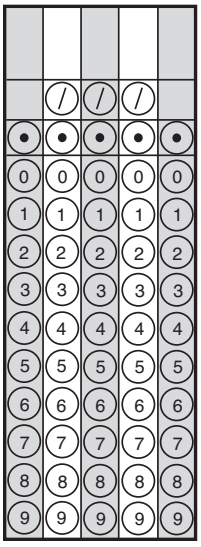
12. An empty corn silo in the shape of a cylinder is being filled with corn.



The silo is filled at a constant rate for a total of 10 hours. The table shows the amount of corn in cubic feet in the silo at the given number of hours after filling started.

Number of Hours	Amount of Corn (cu ft)
0	0
3	2475
5	4125
8	6600

Enter the **percent** of the silo that is filled with corn at 10 hours.



13. Kyle was given the following problem to solve.

A company sells baseball gloves and bats. The gloves regularly cost $30 and the bats regularly cost $90. The gloves are on sale for $4 off, and the bats are on sale for 10% off. The goal is to sell $1,200 worth of bats and gloves each week. Last week, the store sold 14 gloves and 9 bats.

Did the store meet its goal?

The steps Kyle used to solve the problem are shown. Select the first step that shows an error.

☐ **Step 1:**

$$\begin{array}{r} \$30 \\ -\ \$4 \\ \hline \$26 \end{array}$$

☐ **Step 2:**

$$\begin{array}{r} \$26 \\ \times\ 14 \\ \hline \$364 \end{array}$$

☐ **Step 3:**

$$\begin{array}{r} \$90 \\ \div\ 0.9 \\ \hline \$100 \end{array}$$

☐ **Step 4:**

$$\begin{array}{r} \$100 \\ \times\ 9 \\ \hline \$900 \end{array}$$

☐ **Step 5:** Yes, the store met its goal.

$$\begin{array}{r} \$900 \\ +\ \$364 \\ \hline \$1264 \end{array}$$

14. All 8th-grade students at a school answered Yes or No to the two surveys shown.

- Do you have a cell phone?
  Yes No
- Do you have an MP3 player?
  Yes No

The same students responded to both questions. Complete the two-way frequency table to show the correct totals for the given data. You must complete **all** five cells of the table for a full credit response.

	MP3 Player	No MP3 Player	Total
Cell Phone	57	122	
No Cell Phone	30	65	
Total			

Answer Key

1. Rational, Irrational, Rational, Irrational, Rational

2. 18 cm

3. $y = -\frac{1}{3}x$

4. D

5. e.g., $4x + 3$

6. D

7.

- ☐ Reflect over the x-axis, dilate about the origin by a scale factor of $\frac{1}{2}$, translate up 5 units.
- ☑ Rotate 90° counterclockwise around the origin, dilate about the origin by a scale factor of $\frac{3}{2}$.
- ☐ Dilate about the origin by a scale factor of $\frac{2}{3}$, rotate 180° clockwise around the origin, translate down 2 units.
- ☑ Dilate about the origin by a scale factor of 2, reflect over the y-axis, dilate about the origin by a scale factor of $\frac{2}{3}$.

8. A

9. e.g., 1) Reflect across the y-axis, 2) Rotate 90° counterclockwise, 3) translate 5 units down, 4) translate 1 unit left

10. D

11. 5 feet per hour

12. 91%

13. Step 3

14.

	MP3 Player	No MP3 Player	Total
Cell Phone	57	122	179
No Cell Phone	30	65	95
Total	87	187	274